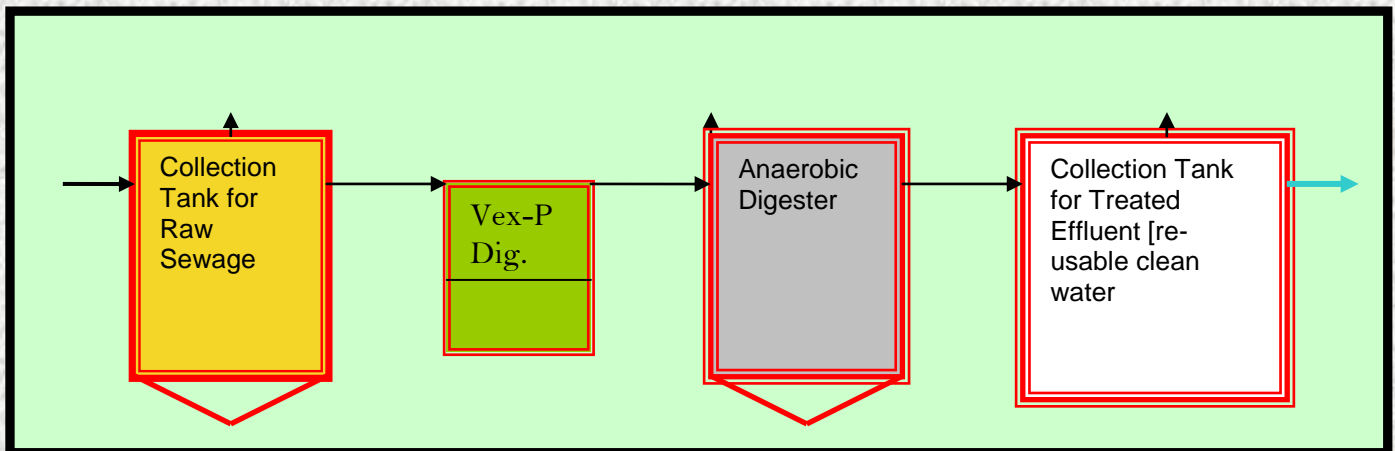




Sewage/Wastewater Treatment System VEX – P



Benefits of VEX-P Digester System:-

1. Usage of 50% less space of land.
2. Complete removal of odour and colour.
3. Savings of up to 50% cost of installation compared to others in the market.
4. Savings of maintenance cost up to 98%.

For commercial inquiries [Plant Purchase, Installation, Commissioning & Maintenance] Please Contact Us.

1. Top 10 reasons why you need to choose VEX-P Treatment System:

1. **Eco-friendly System** – system can be a source of renewable energy and green environment.
2. **Capacity** - Capable of handling in excess of 4.55 million litres per day (lpd).
3. **Free Technical Support** – Our Knowledgeable engineers will help you:
 - i. Size and select correct plant sizes
 - ii. Design an effective system for your application
 - iii. Install, commission, optimize and use Vex-P system.
4. **No Electricity required** - The system is self driven and does not require any electricity at all for the process. It relies on gravity and natural air flow to work.
5. **Air Cooled** - works well at up to +40°C, no need to pay for water, water conditioning & air conditioning systems.
6. **Low Operational Costs** – self driven hence zero operational costs.
7. **Low cost of Maintenance**, no serviceable parts, leak proof construction, reliable, less operating cost.
8. **Improved aesthetics and compact**– the system is installed underground hence the plant area can be covered with grass and flowers.
9. **Completely Silent** – no presence of pumps, motors or compressors.
10. **Huge savings on water costs:** On average, up to 90% of liquid waste is re-cycled back for domestic use.

2. Commercial Aspects of Vex-P System

This new technology in Sewage Treatment, called Fluidized Fixed Bed Reactor Technology, promises benefits like:-

- ❖ Up to 50% lower plant cost.
- ❖ Up to 98% lower operating costs.
- ❖ Up to 90% lower maintenance costs.
- ❖ Up to 90% less sludge production.
- ❖ Up to 60% smaller footprint (can even be set up underground).

Speedy plant construction (2 to 6 weeks for small/medium sized plants) ensures high purity level of treated water, as below:

(i) BOD (Biological Oxygen Demand): less than 5 mg/Liter,

(ii) COD (Chemical Oxygen Demand): less than 60 mg/Liter (or even better)

- ❖ Meets NEMA specifications of effluent discharge
- ❖ Meets all input specifications of wastewater from large industries/ cities/ towns.
- ❖ This technology has varied applications:
- ❖ Small sizes for both industrial and domestic applications.
- ❖ Can be readily installed cost effectively in small homes, individual/ small business establishments like car washes, bakeries, restaurants, mini-hotels, etc., and plants for rural areas.
- ❖ Can be used to facilitate re-use of water for purposes like golf courses, toilets, gardening, and even washing.
- ❖ Or just let off the treated water to recharge the ground water.

Additional Merits of This Technology:

- ❖ Less Land Requirement
- ❖ No Electrical And Mechanical Equipments
- ❖ Less Detention Period
- ❖ No Power Consumption
- ❖ Aeration Tank Is Not Required
- ❖ Complete Removal of Colour And Odour
- ❖ Possibilities to Reuse the Treated Effluent.
- ❖ Reduction of BOD by 95%, COD by 90% and sulfide by 100%.

3. Technical Aspects of Vex-P System

Vex-P system uses a combination of fluidized and fixed bed reactor mechanisms.

3.1 **Vex-P Immobilized Bed Reactor** - immobilized bed reactor process has been used more successfully for the treatment of wastewater. Under many conditions, immobilized bed reactors have an advantage over either free cells or immobilized enzymes. By preventing washout, immobilization allows a high cell density to be maintained in a bio-reactor at any flow rate. Catalytic stability is greater for immobilized cells and some immobilized microorganisms tolerate higher concentration of toxic compounds than do their non-immobilized counterparts.

- 3.2 **Vex-P Advanced 'Immobilized Bed Reactor' technology for treatment of wastewater – the concepts deployed in this technology are:**
- 3.2.1 Immobilization of organisms in the carrier matrix will prevent the dissipation of oxygen.
 - 3.2.2 Accessibility of enzymes to the substrate is increased by reducing the mean free path of the bio catalyst to the substrate.
 - 3.2.3 Reduce the cellular synthesis by using the organisms with low-yield coefficient In Vex-P Advanced 'Immobilized Bed Reactor' technology, the carrier matrix used is Vex-P designed medium of low surface area. The bacteria immobilized in anoxic zone fragments the organics into simpler compounds.
- 3.3 **Vex-P Advanced 'Immobilized Bed Reactor' technology applied to Leather Industry -** The Advanced 'Immobilized Bed Reactor' system performs at a credible level for the removal of organics estimated as BOD and COD from wastewater generated in garment leather manufacturing industry. The maintenance cost of the effluent treatment plant is greatly reduced, through savings on electricity and chemicals. The treated water is able to support the growth of vegetative plants and aquatic bred animals.
- 3.4 **Vex-P Advanced 'Immobilized Bed Reactor' technology applied to Textile industry –** Vex-P Advanced 'Immobilized Bed Reactor' system can be applied for the treatment of wastewater discharged from textile-yarn-dyeing industry. The wastewater contains the dissolved organics classified under dyestuff, starch, EDTA, citrate etc. The treated wastewater from the Vex- P system is able to meet the discharging standards reused within the industry or used for irrigation purposes.
- 3.5 **Vex-P Advanced 'Immobilized Bed Reactor' technology applied to chemical industry –** The wastewater from most industries is of high COD content in the range of 70-90 g/l. The treated wastewater is expected to meet the municipal discharging standard i.e. COD 1000 mg/l and BOD 500 mg/l. Vex-P system which combines anaerobic treatment followed by Advanced Immobilized Bed Reactor treatment is the best for meeting such stringent standards. The anaerobic system prescribed is anaerobic contact filter filled with polymeric material of Vex-P determined void ratio. The anaerobically treated wastewater is treated further in Vex-P

Advanced 'Immobilized Bed Reactor'. The treated wastewater from Vex-P Advanced 'Immobilized Bed Reactor' is then able to meet the discharging standards prescribed.

- 3.6 **Vex-P Advanced 'Immobilized Bed Reactor' technology applied to Pharmaceutical industry** - The wastewater discharged from such industries widely vary in characteristics. Aerobic biological consortia generally used in conventional treatment units are exposed to shock load applications as highly fluctuating organic loads are applied. Hence, aerobic biological system requires a supporting device to offset the shock load application. This system has been proved to be resistant to shock load applications. The treated wastewater from Vex-P Advanced 'Immobilized Bed Reactor' based effluent treatment plant can be utilized for irrigation.
- 3.7 **Vex-P Advanced 'Immobilized Cell Reactor' technology applied to treatment of domestic wastewater** - Domestic wastewater discharged from domestic sector is complex in nature due to the presence of organic, inorganic chemicals, wide spectrum of organisms that are pathogenic and non-pathogenic in nature. Conventional biological treatment systems fail to accomplish removal of dissolved organics and microorganisms to the satisfactory level. Moreover, the systems are not efficient enough to recover the water for reuse purpose. Domestic wastewater is screened and passed through Vex-P filters to remove the suspended solids. The screened domestic wastewater is treated in anaerobic reactor. The anaerobic treated wastewater is applied over the surface of the Vex-P Advanced 'Immobilized Bed Reactor' reactor. The Vex-P Advanced 'Immobilized Bed Reactor' reactor has an integrated biological and chemical oxidation incorporated in a single reactor.

4. Principal Markets

VEX-P principal markets include **residential, commercial, institutional** and **municipal wastewater treatment** up to 4.55 million litres per day (lpd). Because wastewater characteristics are site specific, we have developed technologies that allow adaptive solutions to a variety of waste streams and the discharge standards required by their receiving environments.

5. Regulatory Conformance

Effluents from VEX-P Systems conform to the requirements of Legal Notice No. 120 [The Environmental Management and Co-ordination [Water Quality] Regulations 2006 which is enforced by the National Environmental Management Authority [NEMA].

6. Installation Cost:

The cost of installation varies depending on the industry/scheme size and the corresponding **VEX-P** model. The costs have been economically estimated and include Supply, Installation [construction of all components] and Commissioning.

7. VEX-P System compared to others in the Market

Below is a table giving comparative analysis between VEX-P Wastewater Treatment Plant and others that are available in the market:

Comparative heading	VEX-P Plant	Others in the Market
Installation cost	Low	High compared to equivalent Plants
Space required	Does not need extra space as the system can be installed underground within the road.	Require extra land within the scheme and most systems are above ground hence becomes eyesores after operating for a few months.
Flexibility	System is flexible as can be installed anywhere within the scheme	Rigid systems as they are installed above ground.
Maintenance and Operational costs	Very low and with no operational costs	Rated high as the systems are mechanically driven hence high maintenance and operational costs.
Market acceptability	Most preferred by most clients due its low maintenance and operational costs	Not preferred due to high cost of maintenance and operation.
Odour/smell problems	System fully enclosed and installed underground with very clear treated effluent, hence no smell.	Some are open to environment and sometimes emit foul smell.

8. Vex-P System – Completed and On-going Projects

The following table gives on going and completed projects where Vex-P wastewater management system has been/is being installed:

Client/Architects	Location	Capacity	Status
Client: Bellcrest Park Ltd. Architects: Mutiso	Athi River, Mlolongo	<ul style="list-style-type: none"> ▪ 800 No. Housing Units ▪ Design Population - 6000 people. 	<ul style="list-style-type: none"> ▪ Four No. Plants to suit design clusters. ▪ One central plant for each

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email:info@vexengineers.com/vexengineers@gmail.com; website: www.vexengineers.com

Client/Architects	Location	Capacity	Status
Meneses International		<ul style="list-style-type: none"> ▪ Daily discharge 900,000litres 	<ul style="list-style-type: none"> ▪ cluster. ▪ Design and drawings on going.
Ashnil Hotels Ltd.	Samburu National Park	<ul style="list-style-type: none"> ▪ Design Population -500 people. ▪ Daily discharge 100,000litres 	<ul style="list-style-type: none"> ▪ One Central Plant - Commissioned and operational. ▪ Effluent being recycled to irrigate lawns and trees.
Client: Sawada Investments Ltd. Architects: Tektoconsult	Mombasa Road, Mlolongo area next to JKIA Resort Club	<ul style="list-style-type: none"> ▪ 70 No. Housing Estate. ▪ Design Population-560 people. ▪ Daily Discharge – 84,000 litres 	<ul style="list-style-type: none"> ▪ One Central Plant - Commissioned and operational.
Client: Ashnil Hotels Ltd. Architects: Design ARTitude.	Maasai Mara Game Reserve	<ul style="list-style-type: none"> ▪ Design population -750 people. ▪ Daily discharge 150,000litres 	<ul style="list-style-type: none"> ▪ One Central Plant – Commissioned.
Client: Guthera Villas Ltd. Architects: Portal Consultancy	Karen	<ul style="list-style-type: none"> ▪ Design population -120 people. ▪ Daily discharge 24,000litres 	<ul style="list-style-type: none"> ▪ One Central Plant – Commissioned.
Client: Adventist University of Africa. Project Manager: Mudasa Property Services Ltd.	Rongai	<ul style="list-style-type: none"> ▪ Design population -120 people. ▪ Daily discharge 24,000litres 	<ul style="list-style-type: none"> ▪ One Central Plant ▪ Construction on going
Architect Dorothy Abonyo	Karen	<ul style="list-style-type: none"> ▪ Design population – 10 people ▪ Daily discharge – 2,000litres 	<ul style="list-style-type: none"> ▪ One Central Plant - Commissioned and operational. ▪ Effluent being recycled to irrigate lawns and trees.
Mr. John Omo	Nyari Estate	<ul style="list-style-type: none"> ▪ Design population – 10 people ▪ Daily discharge – 2,000litres 	<ul style="list-style-type: none"> ▪ One Central Plant - Commissioned and operational. ▪ Effluent being recycled to irrigate lawns and trees.
Dr. Okello	Karen	<ul style="list-style-type: none"> ▪ Design population – 10 people ▪ Daily discharge – 2,000litres 	<ul style="list-style-type: none"> ▪ One Central Plant – construction on going

9. Installation Cost:

The cost of installation varies depending on the scheme size and the corresponding **VEX-P** model. The costs have been economically estimated and include Supply, Construction, Installation and Commissioning. These are as per the table below: